

**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OF PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

1. A modified xylanase comprising at least one substituted amino acid residue at a position selected from the group consisting of amino acid 11, 116, 118, 144 and 161, said position determined from sequence alignment of said modified xylanase with *Trichoderma reesei* xylanase II amino acid sequence defined in SEQ ID NO:16.
2. The modified xylanase of claim 1, wherein modified xylanase exhibits improved thermophilicity, alkalophilicity, expression efficiency, or a combination thereof, in comparison to a corresponding native xylanase.
3. The modified xylanase of claim 1, wherein said substituted amino acid is at position 144 and is selected from the group consisting of basic amino acids.
4. The modified xylanase of claim 3, wherein said at least one substituted amino acid is selected from a group consisting of Arg and Lys.
5. The modified xylanase of claim 4, wherein said modified xylanase is derived from a Family 11 xylanase.
6. The modified xylanase of claim 5, wherein said Family 11 xylanase is a *Trichoderma reesei* xylanase.
7. The modified xylanase of claim 4, further comprising a His at positions 10 and 105, Met at position 27, Leu at position 29, Ala at positions 75 and 125, and Glu at position 129 (HML-AHAE).
8. The modified xylanase of claim 1, wherein said substituted amino acid is at position 161 and is selected from the group consisting of basic amino acids.
9. The modified xylanase of claim 8, wherein said at least one substituted amino acid is selected from a group consisting of Arg, Lys and His.

10. The modified xylanase of claim 9, wherein said modified xylanase is derived from a Family 11 xylanase.
11. The modified xylanase of claim 10, wherein said Family 11 xylanase is a *Trichoderma reesei* xylanase.
12. The modified xylanase of claim 9, further comprising a His at positions 10 and 105, Met at position 27, Leu at position 29, Ala at positions 75 and 125, and Glu at position 129.
13. The modified xylanase of claim 12, further comprising a second substituted amino acid at position 144 and is selected from the group consisting of basic amino acids.
14. The modified xylanase of claim 13, wherein said second substituted amino acid is selected from a group consisting of Arg and Lys.
15. The modified xylanase of claim 14, wherein said modified xylanase is derived from a Family 11 xylanase.
16. The modified xylanase of claim 15, wherein said Family 11 xylanase is a *Trichoderma reesei* xylanase.
17. The modified xylanase of claim 1, wherein said substituted amino acid is at position 11 and is selected from the group consisting of an acidic amino acid.
18. The modified xylanase of claim 17, wherein said at least one substituted amino acid is Asp.
19. The modified xylanase of claim 18, wherein said modified xylanase is derived from a Family 11 xylanase.
20. The modified xylanase of claim 19, wherein said Family 11 xylanase is a *Trichoderma reesei* xylanase.
21. The modified xylanase of claim 18, further comprising a His at positions 10 and 105, Met at position 27, Leu at position 29, Ala at positions 75 and 125, and Glu at position 129.

22. The modified xylanase of claim 21, further comprising a second and a third substituted amino acid at positions 144 and 161, and is selected from the group consisting of basic amino acids.
23. The modified xylanase of claim 22, wherein said second substituted amino acid at position 144 is selected from a group consisting of Arg and Lys, and said third substituted amino acid at position 161 is selected from a group consisting of Arg, Lys and His.
24. The modified xylanase of claim 23, wherein said modified xylanase is derived from a Family 11 xylanase.
25. The modified xylanase of claim 24, wherein said Family 11 xylanase is a *Trichoderma reesei* xylanase.
26. The modified xylanase of claim 1, wherein said substituted amino acid is at position 116 and is selected from the group consisting of small hydrophobic amino acids.
27. The modified xylanase of claim 26, wherein said at least one substituted amino acid is Gly.
28. The modified xylanase of claim 27, wherein said modified xylanase is derived from a Family 11 xylanase.
29. The modified xylanase of claim 28, wherein said Family 11 xylanase is a *Trichoderma reesei* xylanase.
30. The modified xylanase of claim 27, further comprising a His at positions 10 and 105, Met at position 27, Leu at position 29, Ala at positions 75 and 125, and Glu at position 129.
31. The modified xylanase of claim 30, further comprising a second substituted amino acid at position 11 and is selected from the group consisting of acidic amino acids, a third and fourth substituted amino acids at positions 144 and 161, and are selected from the group consisting of basic amino acids.
32. The modified xylanase of claim 31, wherein said second substituted amino acid at position 11 is Asp, said third substituted amino acid at position 144 is selected from a

group consisting of Arg and Lys, and a fourth substituted amino acid at position 161 is selected from a group consisting of Arg, Lys and His.

33. The modified xylanase of claim 32, wherein said modified xylanase is derived from a Family 11 xylanase.
34. The modified xylanase of claim 33, wherein said Family 11 xylanase is a *Trichoderma reesei* xylanase.
35. The modified xylanase of claim 1, wherein said substituted amino acid is at position 118 and is selected from the group consisting of medium-size non-aromatic hydrophobic amino acids.
36. The modified xylanase of claim 35, wherein said at least one substituted amino acid is Cys.
37. The modified xylanase of claim 36, wherein said modified xylanase is derived from a Family 11 xylanase.
38. The modified xylanase of claim 37, wherein said Family 11 xylanase is a *Trichoderma reesei* xylanase.
39. The modified xylanase of claim 36, further comprising a His at positions 10 and 105, Met at position 27, Leu at position 29, Ala at positions 75 and 125, and Glu at position 129.
40. The modified xylanase of claim 39, further comprising a second substituted amino acid at position 11 and is selected from the group consisting of acidic amino acids, a third and fourth substituted amino acids at positions 144 and 161, and are selected from the group consisting of basic amino acids.
41. The modified xylanase of claim 40, wherein said second substituted amino acid at position 11 is Asp, said third substituted amino acid at position 144 is selected from a group consisting of Arg and Lys, and a fourth substituted amino acid at position 161 is selected from a group consisting of Arg, Lys and His.

42. The modified xylanase of claim 41, wherein said modified xylanase is derived from a Family 11 xylanase.
43. The modified xylanase of claim 42, wherein said Family 11 xylanase is a *Trichoderma reesei* xylanase.
44. The modified xylanase of claim 40, wherein said second substituted amino acid at position 11 is Asp, said third substituted amino acid at position 116 is Gly, said fourth substituted amino acid at position 144 is selected from a group consisting of Arg and Lys, and a fifth substituted amino acid at position 161 is selected from a group consisting of Arg, Lys and His.
45. The modified xylanase of claim 44, wherein said modified xylanase is derived from a Family 11 xylanase.
46. The modified xylanase of claim 45, wherein said Family 11 xylanase is a *Trichoderma reesei* xylanase.
47. A use of the modified xylanase in claim 1 in an industrial process.
48. The use as defined in claim 47 wherein said industrial process is a pulp manufacturing.
49. A modified xylanase selected from the group (as described in Table 2) consisting of:
- TrX-HML-75A105H-125A129E-144R
  - TrX-HML-75A105H-125A129E-144R161R
  - TrX-116G
  - TrX-118C
  - TrX-HML-75A105H-116G-125A129E-144R
  - TrX-HML-75A105H-118C-125A129E-144R
  - TrX-H-11D-ML-75A105H-125A129E-144R161R
  - TrX-H-11D-ML-75A105H-116G-125A129E-144R161R
  - TrX-H-11D-ML-75A105H-118C-125A129E-144R161R
  - TrX-H-11D-ML-75A105H-116G118C-125A129E-144R161R

50. A xylanase comprising an amino acid residue at a position selected from the group consisting of amino acid 11, 116, 118, 144 and 161, said position determined from sequence alignment of said modified xylanase with *Trichoderma reesei* xylanase II amino acid sequence defined in SEQ ID NO:16, said amino acid not found at said position in said *T. reesei* xylanase II amino acid sequence defined in SEQ IDNO:16.
51. A xylanase comprising non-polar amino acid at position 116, said position determined from sequence alignment of said modified xylanase with *Trichoderma reesei* xylanase II amino acid sequence defined in SEQ ID NO:16.
52. The xylanase of claim 51, wherein said non-polar amino acid is Gly.
53. A xylanase comprising a non-aromatic hydrophobic amino acid at position 118, said position determined from sequence alignment of said modified xylanase with *Trichoderma reesei* xylanase II amino acid sequence defined in SEQ ID NO:16.
54. The xylanase of claim 53, wherein said, non-aromatic hydrophobic amino acid is Cys
53. A xylanase comprising a basic amino acid at position 144, said position determined from sequence alignment of said modified xylanase with *Trichoderma reesei* xylanase II amino acid sequence defined in SEQ ID NO:16.
54. The xylanase of claim 53, wherein said basic amino acid is Arg.
55. A xylanase comprising an acidic amino acid at position 11, a non-polar amino acid at position 116, and a basic amino acid at position 144, said position determined from sequence alignment of said modified xylanase with *Trichoderma reesei* xylanase II amino acid sequence defined in SEQ ID NO:16
56. The xylanase of claim 55, wherein said acidic amino acid is Asp, said non-polar amino acid is Gly, and said basic amino acid is Arg.

57. A xylanase comprising an acidic amino acid at position 11, a non-aromatic hydrophobic amino acid at position 118, and a basic amino acid at position 144, said position determined from sequence alignment of said modified xylanase with *Trichoderma reesei* xylanase II amino acid sequence defined in SEQ ID NO:16
58. The xylanase of claim 57, wherein said acidic amino acid is Asp, said non-aromatic hydrophobic amino acid is Cys, and said basic amino acid is Arg.
59. A modified xylanase comprising at least one substituted amino acid residue, wherein said modified xylanase is characterized as having a maximum effective temperature (MET) between about 69°C to about 84°C, and wherein said modified xylanase is a Family 11 xylanase obtained from a *Trichoderma* sp..
60. The modified xylanase of claim 59, wherein said MET is between about 70° to about 84°C
61. A modified xylanase comprising at least one substituted amino acid residue, wherein said modified xylanase is characterized as having a maximum effective pH (MEP) between about pH 5.8 to about pH 8.4, and wherein said modified xylanase is a Family 11 xylanase obtained from a *Trichoderma* sp..
62. The modified xylanase of claim 61, wherein said MEP is between about pH 6.0 to about pH 8.0
63. The modified xylanase of claim 59, wherein said modified xylanase is further characterized as having a maximum effective pH (MEP) is between about pH 5.8 to about pH 7.6.
64. The modified xylanase of claim 60, wherein said modified xylanase is further characterized as having a maximum effective pH (MEP) is between about pH 6.5 to about pH 7.4.